
Chapter 12

Multivariate Model Predicting Teen Substance Use

The ecological model of youth development suggests that there are important factors at each level of the model that influence teen behaviors. Often individual factors are presented alone, such as teen perception of substance use risk, time spent in various activities, parenting style and parental monitoring, neighborhood support, etc. This chapter will present a model in which the factors are considered together and the relative strength of each factor in predicting substance use will be identified. However, the caveat is that this model does not contain all critical factors. One factor of particular importance, peer influence, was not included in the survey questions. Thus, like all models, our model is limited by the type of data that was collected.

Why do we want to do this? We want to test the notion that every level of the ecological model makes a contribution to youth development. For example, do parent behaviors make a difference in predicting teen behavior? In particular, we want to examine those factors that are amenable to change and influence. Some factors such as temperament or age cannot be changed. Other factors such as perceived neighborhood support, perceived school attachment, or levels of parental monitoring can be altered. The goal is to identify those factors that have influence and can be enhanced as protective factors in the development of youth. We hope this will allow the communities to more effectively use the information from the Teen Assessment Project in developing appropriate programs and interventions.

Multivariate Model

In the 2000-2001 TAP Multi-Community Report a multivariate model of teen development was created that included the levels of youth, family, school, and community. The chart below depicts each level and the specific factors at each level.

Ecological Level	Factors
Youth	Social responsibility Perceived risk of alcohol, drugs, tobacco Time spent at home alone with no adults present Time spent working
Family	Parenting style Parental values and attitudes Parent-teen communication Parental monitoring
School	School attachment
Community	Neighborhood support Neighborhood monitoring

Creation of the Model for the Lin-Wood School District Data

Due to the small sample size, modifications were suggested for the Lin-Wood School District multivariate model. Instead of examining all factors as in the 2000-2001 TAP Multi-Community Report, the Lin-Wood model had to contain fewer factors (Green, 1991). Factors that had previously been shown to be significantly related to substance abuse were chosen: school attachment; risk perception of substances; parental attitudes, parental values, parental consequences; and neighborhood support, neighborhood monitoring;

Listed below is each factor of the model and the questions that make up that factor. In addition to those factors, we have to identify the effect of demographic variables such as gender and grade. Research suggests that substance use increases with age and can vary by gender (Johnston, O'Malley & Bachman, 2003). Thus our complete model includes demographic variables and the factors below. We used this model to examine the links between these factors and teen substance use.

Youth

Attachment to school

I enjoy going to school.

The rules in my school are enforced fairly.

I will probably drop out before I complete high school.

I believe I am getting a good, high quality education at my school.

Risk perception

How much do you think people risk harming themselves (*physically or in other ways*) if they:

Smoke one or more packs of cigarettes a day?

Try marijuana once or twice?

Smoke marijuana regularly?

Try inhalants once or twice?

Family

Parental Monitoring

If I am going to be home late, I'm expected to call my parent(s) to let them know.

I tell my parent(s) who I'm going to be with before I go out.

When I go out at night, my parent(s) know where I am.

My parent(s) know who my friends are.

I talk to my parent(s) about the plans I have with my friends.

When I go out, my parent(s) usually ask me where I'm going.

My parent(s) usually know what I am doing after school.

My parent(s) know how I spend my money.

Parental attitudes

My parent(s) think it is wrong for teens my age to smoke cigarettes.

My parent(s) think it is wrong for teens my age to drink alcohol.

My parent(s) think it is wrong for teens my age to have sexual intercourse.

Parental consequences

If your parent(s) knew you were smoking cigarettes, do you think you would get in trouble at home?

If your parent(s) knew you were drinking beer, wine, or liquor, do you think you would get in trouble at home?

If your parent(s) knew you were having sex, do you think you would get in trouble at home?

Community

Neighborhood Support

My town is a good place to live.

In my town there are a lot of fun things for kids my age to do.

If I had a problem, there are neighbors whom I could count on for help.

Neighborhood Monitoring

If I were to do something wrong, adults in my town would probably tell my parent(s)/ guardian(s).

Adults in my neighborhood or community keep an eye on what teens are up to.

If an adult in my town saw me drinking alcohol, they would probably tell my parent(s)/ guardian(s).

Prediction of Increasing Substance Use

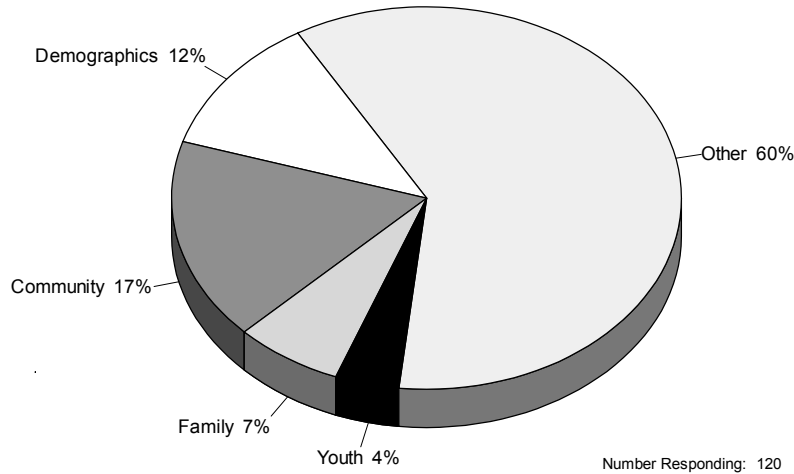
Rather than look at how our model predicts increasing use of individual substances (e.g. alcohol, smoking tobacco, marijuana, cocaine, inhalants, etc.), we wanted to examine substance use across the three substances with the highest prevalence: smoking tobacco, alcohol, and marijuana. The outcome we want to predict from *Youth, Family, and Community* factors is the use of these substances.

Individual students vary in the level of substance use; some individuals use more often than others. When a group of variables, or a factor, is used to predict substance use, its predictive usefulness can be assessed by looking at the percent of variance in substance use that it accounts for. A predictor variable that is completely unrelated to substance use would explain 0% of the variance. The higher the percent of variance that is accounted for by a predictor, the stronger its predictive relationship to the substance use.

For students in Lin-Wood Cooperative School District, the model with the factors of Youth, Family, and Community explained 40% of the variance.

Figure 12-1 shows the overall multivariate model predicting use of marijuana, alcohol, and smoking tobacco. The strongest predictive factor was **Community** (17%), followed by **Family** (7%), and **Youth** (4%).

Figure 12-1: Multivariate Model Predicting Substance Use (Alcohol, Smoking, Marijuana)



The **Community** factor accounted for 17% of the variance. Within that factor higher levels of neighborhood support were related to lower levels of substance use. Neighborhood support was also seen in the 2000-2001 TAP Multi-Community Report (2002) as a significant predictor. It is surprising, however, that the **Community** factor explains more variance than the **Family** factor. In prior research with TAP multi-community and single community data the **Family** factor has always been the strongest predictor. Dr. Warner, University of New Hampshire statistical consultant, has suggested that this result may be due to sampling error with such a small sample.

The **Family** factor explained 7% of the variance. There were no individual items within that factor that were significant due to the sample size. However, the pattern as shown in the 2000-2001 TAP Multi-Community Report (2002) was repeated in that the two strongest predictors were parental monitoring and parental consequences.

Four percent (4%) of the variance in substance use was explained by the **Youth** factor. Similar to previous TAP research as the perceived risk of substance use increased, the likelihood of substance use decreased. School attachment was also important. Students with higher levels of school attachment had lower levels of substance use.

The **Demographics** variables explained 12% of the prediction of substance use. As youth age, levels of substance use increase.

Conclusions

Since the work of Urie Bronfenbrenner (1977), researchers have focused on the development of behaviors within context, within an ecological model. All levels of the model have a role in shaping the outcome. This research showed that in the Lin-Wood dataset as in the TAP 2000-2001 Multi-Community dataset, the factors of **Youth, Family, and Community** were significantly related to teen substance use. Caution is urged in interpretation of this multivariate model given the small size of the sample. In particular, the fact that the strongest predictor of substance use was the **Community** factor and within that Neighborhood Support, could be due to statistical error, especially since this result has not been found in any other TAP community datasets.

As in the 2000-2001 TAP Multi-Community Report (2002) factors in each level of the ecological model were related to teen substance use. In addition to neighborhood support, the characteristics of perceived parental monitoring and parental consequences were important. As parental monitoring increased and as certainty of parental consequences for behaviors increased, substance use decreased. Perceived attachment to school was also a strong predictor of substance use. Students with greater attachment to school showed less substance use. As student perception of risk of substance use increased, substance use decreased.

It is critical to emphasize again that our analyses are limited by the information collected. We are missing information about peer influences and how they operate with parental influences to effect behavior. We are missing other important family variables such as smoking status of parents, drinking status of parents, etc. There are also other community and youth variables that would be helpful in examining the question of substance use. This model does give us confirmation that the factors we looked at do make a difference. Parental monitoring and knowledge of parental consequences can be strengthened as protective factors. Perceived school attachment can be enhanced as a protective factor. Information about the risks of substance use would be particularly useful.

These analyses affirm the importance of all levels of the ecological model and identify specific protective factors. Communities can use this information in their efforts to foster positive youth development.